UITS Research Technologies update for Bloomington Faculty Council Technology Policy Committee

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RESEARCH TECHNOLOGIES
INDIANA UNIVERSITY
University Information Technology Services

PERVASIVE TECHNOLOGY INSTITUTE
INDIANA UNIVERSITY

What is Research Technology's mission?

The mission of the Research Technologies division of UITS is to develop, deliver and support advanced technology solutions that improve the productivity of and enable new possibilities in research, scholarly endeavors, and creative activity at Indiana University and beyond; and to complement this with education and technology translation activities to improve the quality of life of people in Indiana, the nation, and the world.

We are a mission- and value-driven organization. We are not a technology-driven organization.

We identify needs, identify possibilities, and discover new ways to meet those needs, realize those possibilities, and create new ones. In so doing, we create, deploy, and support technology. **We are a technology-driving organization.**

Roughly one third of personnel are funded by external agencies

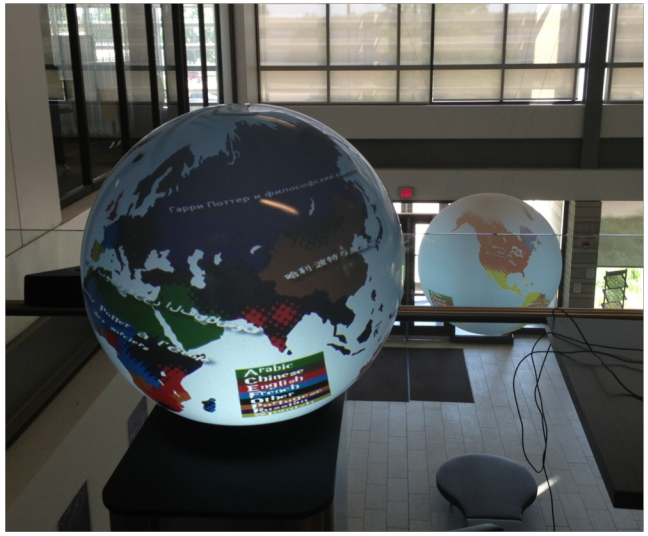
We've supported some important research and interesting creative activity along the way

SNAKE EVOLUTION
FRUIT FLY TRANSCRIPTOME
HIGGS BOSON NOBEL PRIZE
One Degree Imager
Operation Ice Bridge
Water flea genome
Fetal Alcohol Spectrum Disorder
Indiana CTSI
Cell surface function
History of philosophy and science
Variations
Ethnography
Music Composition
Fine arts
Performing arts

A boa constrictor body shown over the shadow of a lizard body: The regions of the spine and body of the snake are as complex as the regions of the lizard – which is not what people previously believed. (Image courtesy University of Nebraska-Lincoln)

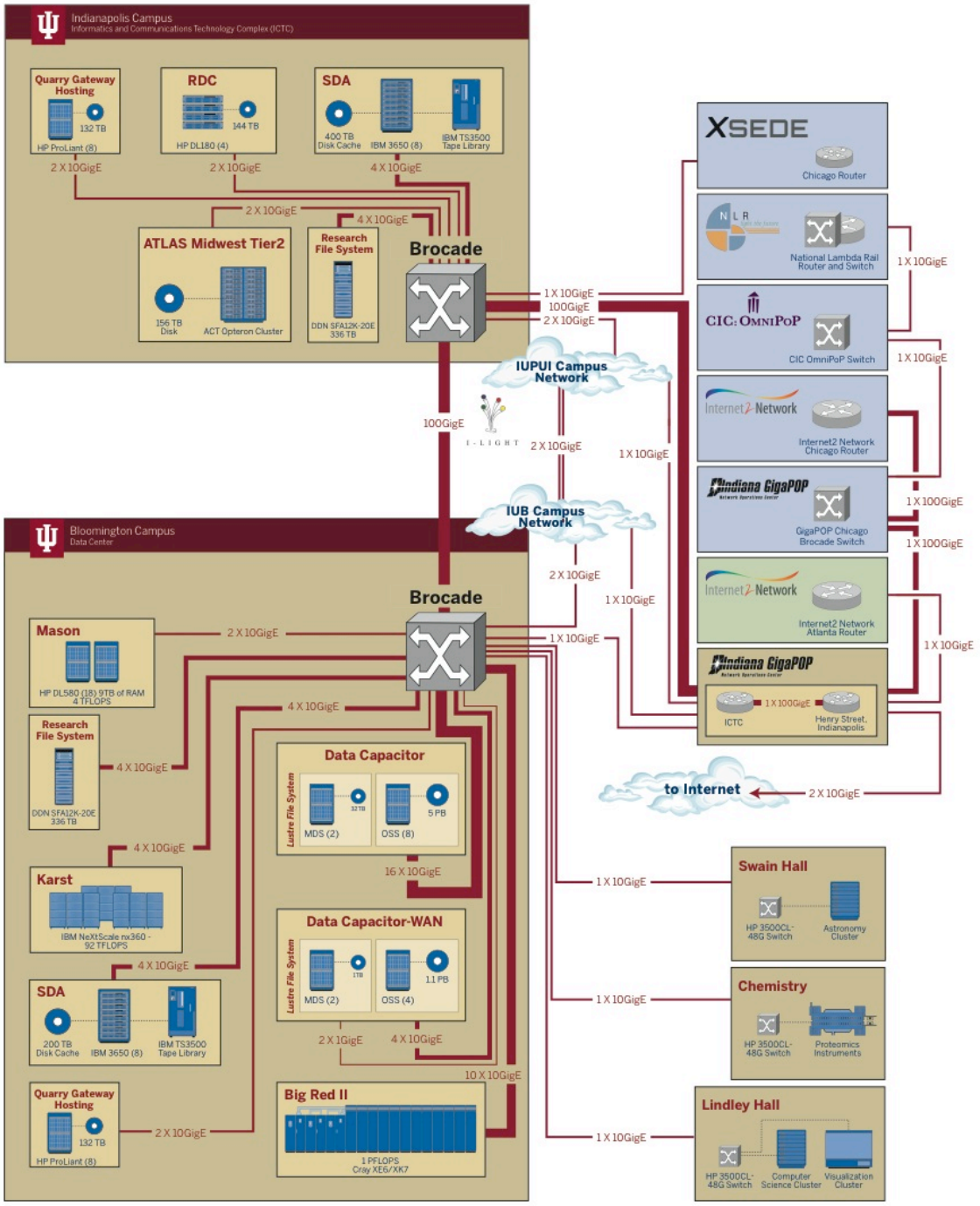
Visualization

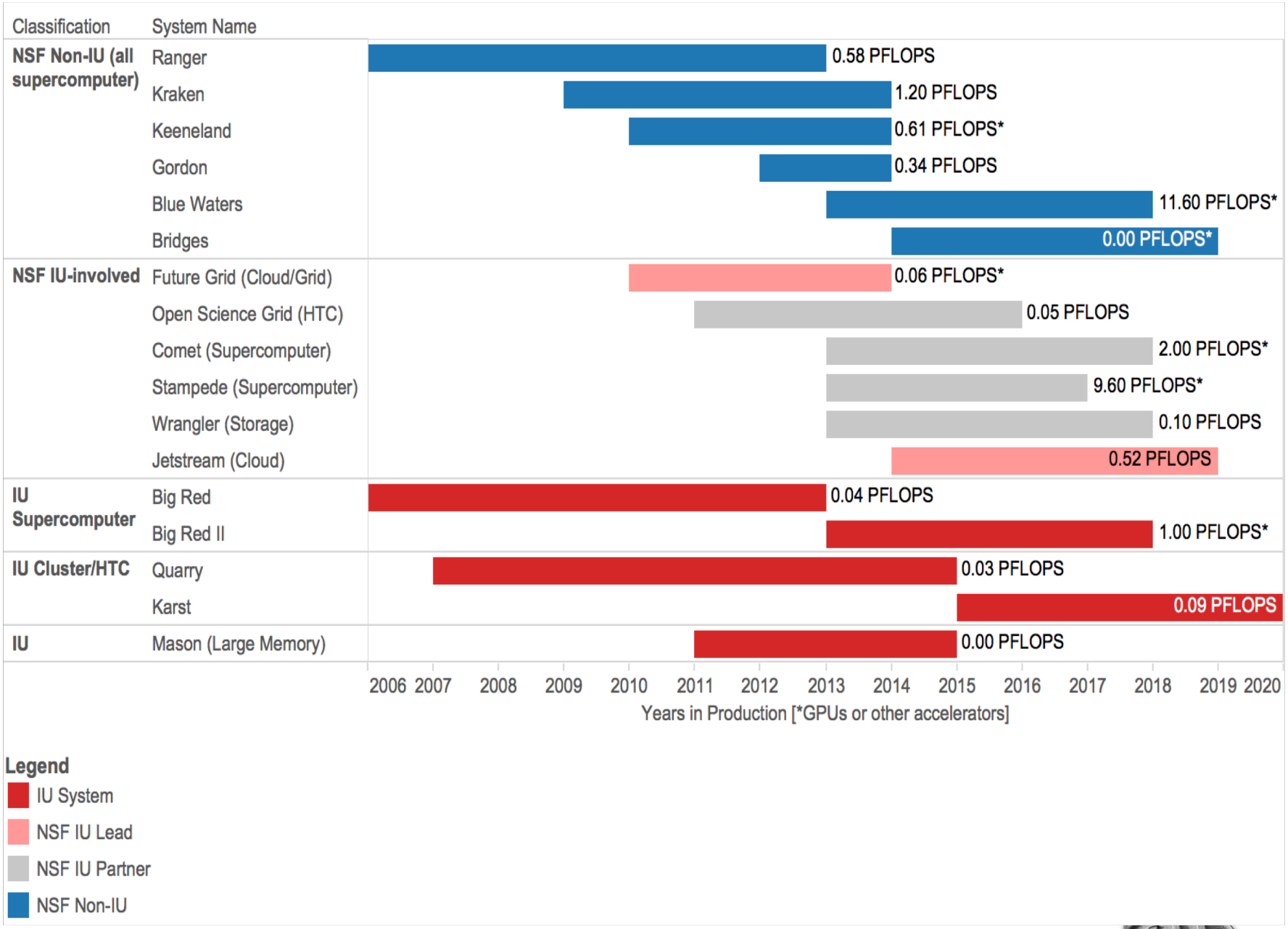
- Science on a Sphere
  - PufferSphere: touchable, portable, lower maintenance and TCO
  - New apps: Google analytics, Streetview, StreamGraph
  - Major presence at SC'14
- IQ-series
  - New Scholars Commons IQ-wall: 3Dstereo, multi-input, Crestron
  - Breaking down "digital signage" & "instruction only" mentality with other units, lower costs



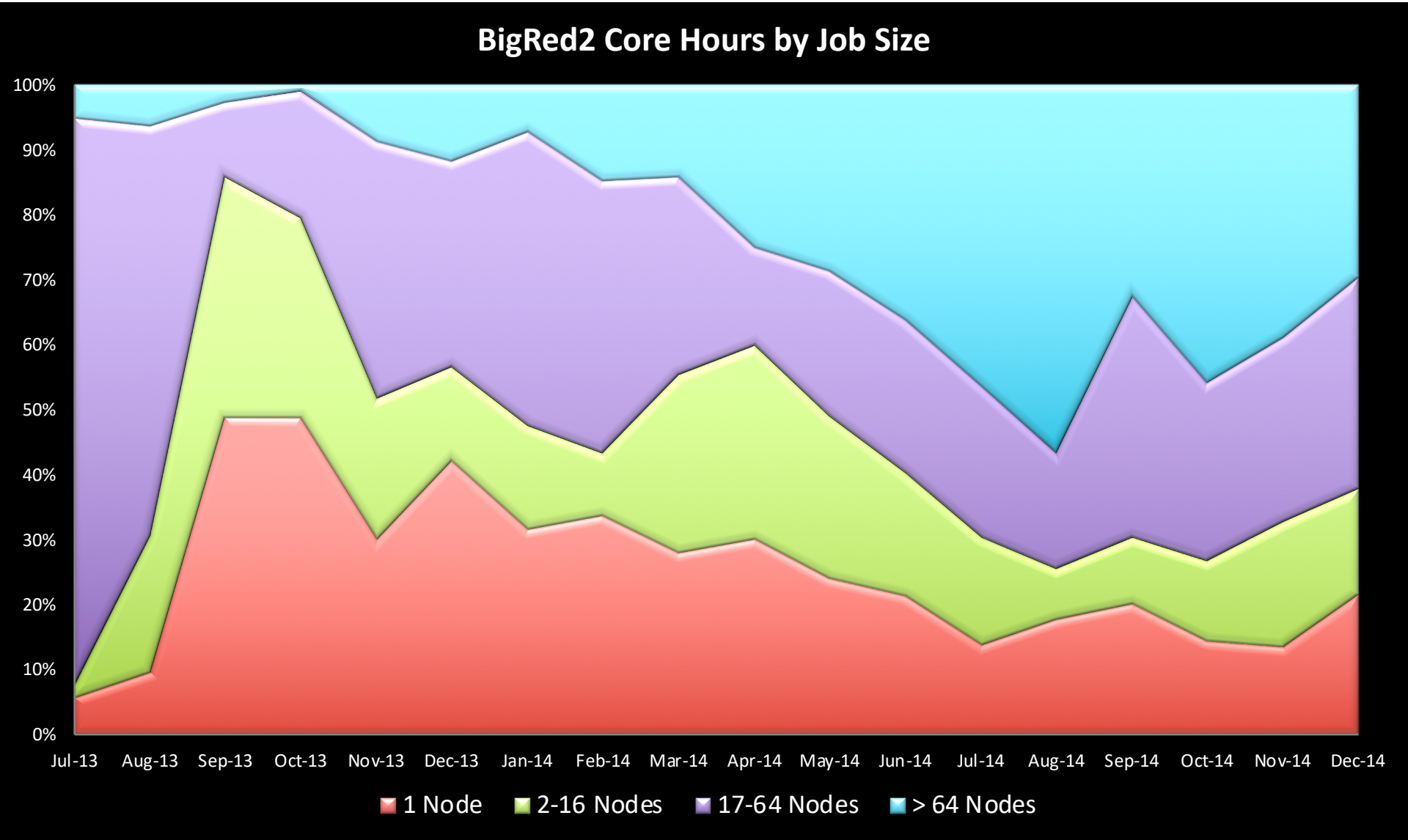
IQ-Wall supports teaching, research at MMWC

Alex Lichtenstein, IU professor of history, inaugurated the IQ-Wall at the MWWC with students in his COLL S104/The Struggle for Civil Rights: Reacting to the Past.

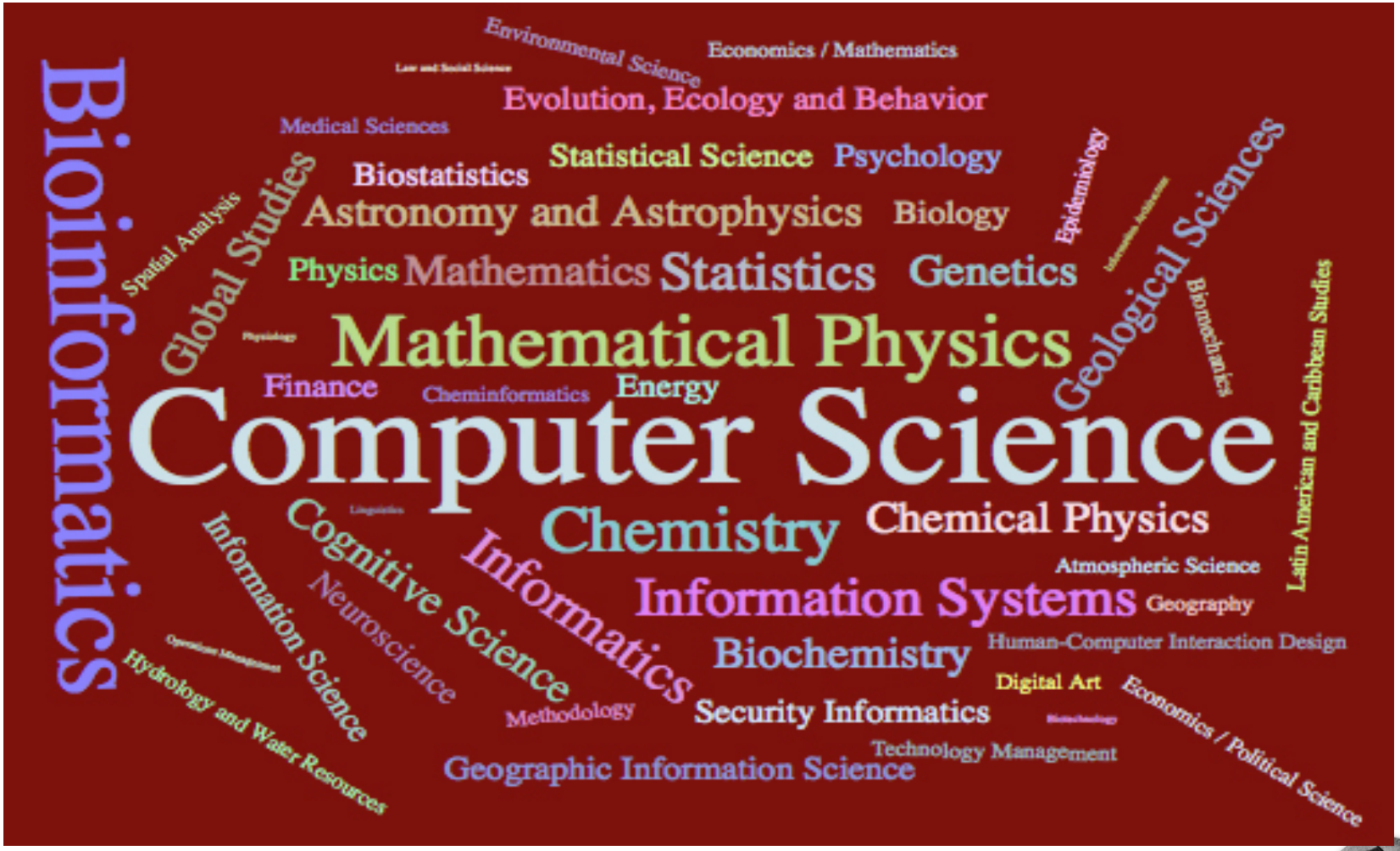

Indianapolis Campus
Informatics and Communications Technology Complex (ICTC)
Quarry Gateway Hosting
132 TB
HP ProLiant (8)
RDC
144 TB
HP DL180 (4)
SDA
400 TB Disk Cache
IBM 3650 (8)
IBM TS3500 Tape Library
2 X 10GigE
2 X 10GigE
4 X 10GigE
2 X 10GigE
4 X 10GigE
ATLAS Midwest Tier2
156 TB Disk
ACT Opteron Cluster
Research File System
DDN SFA12K-20E 336 TB
Brocade
1 X 10GigE
100GigE
2 X 10GigE
XSEDE
Chicago Router
National Lambda Rail Router and Switch
CIC: OmniPoP
CIC OmniPoP Switch
Internet2 Network
Internet2 Network Chicago Router
Indiana GigaPOP
GigaPOP Chicago Brocade Switch
Internet2 Network
Internet2 Network Atlanta Router
Indiana GigaPOP
1 X 100GigE
ICTC
Henry Street, Indianapolis
1 X 10GigE
1 X 100GigE
1 X 100GigE
1 X 10GigE
IUPUI Campus Network
I-LIGHT
100GigE
2 X 10GigE
1 X 10GigE
IUB Campus Network
2 X 10GigE
1 X 10GigE
to Internet
2 X 10GigE
Bloomington Campus
Data Center
Brocade
Mason
HP DL580 (18) 9TB of RAM 4 TFLOPS
2 X 10GigE
1 X 10GigE
Research File System
DDN SFA12K-20E 336 TB
4 X 10GigE
4 X 10GigE
Data Capacitor
Lustre File System
32TB
MDS (2)
5 PB
OSS (8)
16 X 10GigE
Karst
IBM NeXtScale nx360 - 92 TFLOPS
4 X 10GigE
Data Capacitor-WAN
Lustre File System
1TB
MDS (2)
1.1 PB
OSS (4)
SDA
200 TB Disk Cache
IBM 3650 (8)
IBM TS3500 Tape Library
2 X 1GigE
4 X 10GigE
10 X 10GigE
Quarry Gateway Hosting
132 TB
HP ProLiant (8)
2 X 10GigE
Big Red II
1 PFLOPS
Cray XE6/XK7
1 X 10GigE
Swain Hall
HP 3500CL-48G Switch
Astronomy Cluster
1 X 10GigE
Chemistry
HP 3500CL-48G Switch
Proteomics Instruments
1 X 10GigE
Lindley Hall
HP 3500CL-48G Switch
Computer Science Cluster
Visualization Cluster


Classification
System Name
NSF Non-IU (all supercomputer)
Ranger
0.58 PFLOPS
Kraken
1.20 PFLOPS
Keeneland
0.61 PFLOPS*
Gordon
0.34 PFLOPS
Blue Waters
11.60 PFLOPS*
Bridges
0.00 PFLOPS*
NSF IU-involved
Future Grid (Cloud/Grid)
0.06 PFLOPS*
Open Science Grid (HTC)
0.05 PFLOPS
Comet (Supercomputer)
2.00 PFLOPS*
Stampede (Supercomputer)
9.60 PFLOPS*
Wrangler (Storage)
0.10 PFLOPS
Jetstream (Cloud)
0.52 PFLOPS
IU Supercomputer
Big Red
0.04 PFLOPS
Big Red II
1.00 PFLOPS*
IU Cluster/HTC
Quarry
0.03 PFLOPS
Karst
0.09 PFLOPS
IU
Mason (Large Memory)
0.00 PFLOPS
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Years in Production [*GPUs or other accelerators]
Legend
IU System
NSF IU Lead
NSF IU Partner
NSF Non-IU

Big Red II – significant large scale parallel usage



Who uses Big Red II



Karst

256 compute nodes

- 2 Intel Xeon E5-2650 v2 8-core processors 512 processors, 4.096 cores 32GB RAM/node

16 data intensive compute nodes

- 2 Intel Xeon E5-2650 v2 8-core processors 32 processors, 256 cores 64GB RAM/node

450TB local spinning disk

91.5 teraflops

11TB total memory

10Gbps local interconnect

Financial support from OVPIT and ORA

Karst Condominium Nodes and Node Colocation

Karst Condominium Nodes

- Condominium nodes – standard: ~$5K for 5 year lifespan. Two Intel Xeon E5-2650 v2 8-core processors; 32 GB of RAM and 250 GB of local disk storage.
- Condominium nodes - Data intensive ~$8K for 5 year lifespan. Two Intel Xeon E5-2650 v2 8-core processors, 64 GB of RAM and 24 TB of local storage.

Karst Node Level Colocation

- Node pricing vary with configuration specs if different than standard colocation nodes, but it's anticipated that standard condominium specs would address the majority of nodes

Supporting IT-28

- High-throughput computing – no cost to user
- Node Level Colocation supports researchers with computational environments that are not able to be addressed via the Intelligent Infrastructure
- Nodes located in IUB Data Center on collaborative IU Science DMZ

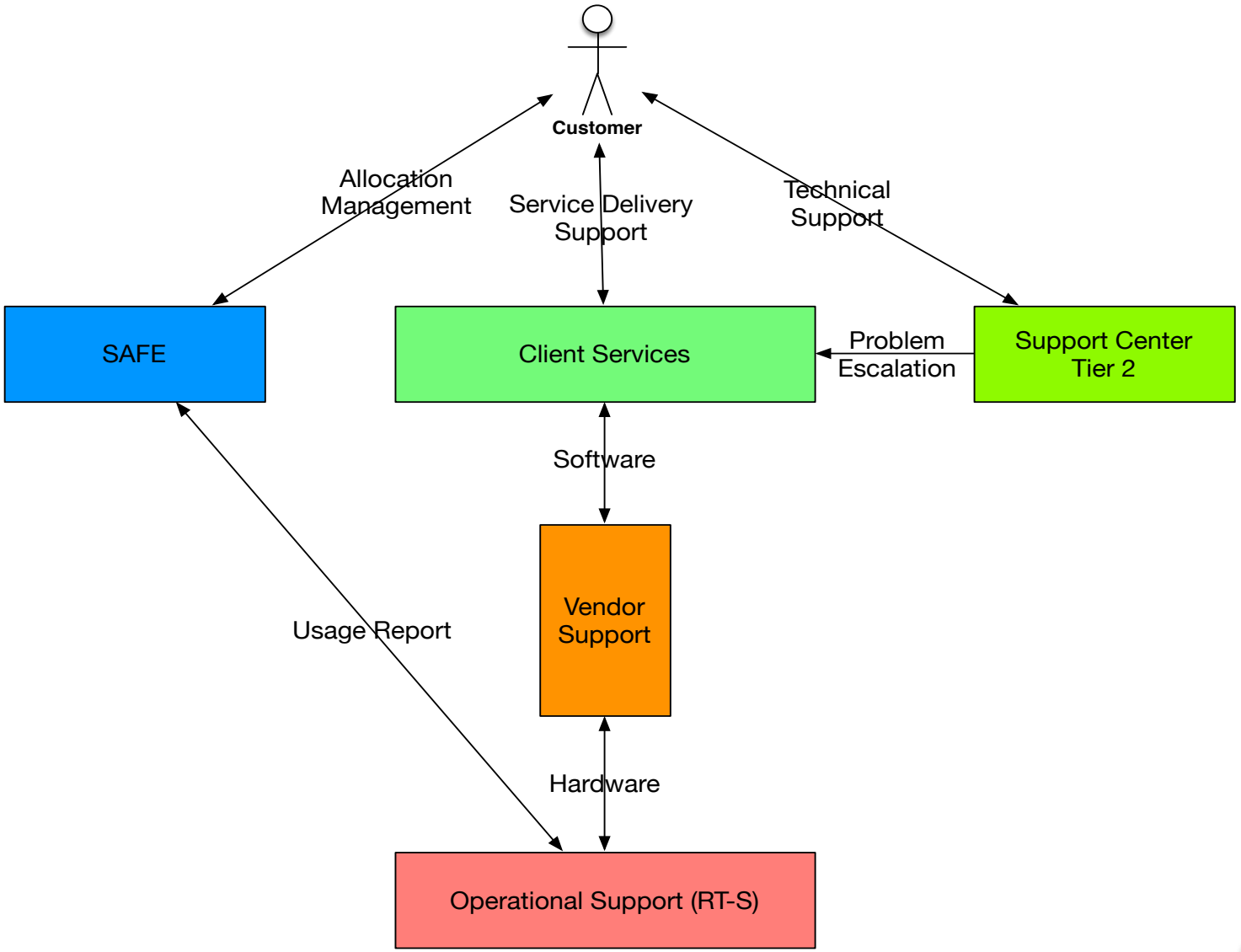
IU File Store status

- No one is happy
- We're doing some things to try to make as many people happy as soon as is humanly possible
- So far we have had two primary goals that have had no common solution. That seems to be changing.
- Priorities
  - IUFS must have the capability of storing critical data
  - IUFS price point should be as close to $0.50 per GB
  - Ability for group access control, user-driven version restoration important

3- or 4- pronged approach

- IUFS – Beta testing – time line 2 months to….
  - to be launched in Spring 2015
  - Will last no more than 1 year with exit strategy for participants
  - 1 TB max allocations
  - No after hours support, support through SC
  - Windows and Mac OS X platforms initially
- IU something something (IURS?) supporting research data that must be accessed at high speed and/or PHI
- Intelligent Infrastructure II – time line months
- Box where appropriate

Organizational Support



Support for grant proposal preparation and execution

RT overall
- Letters of commitment

Collaboration and Engagement Support Group
- Support with IT-related aspects of grant preparation
- Compliment, not duplicate, VPR services

Architecture based methods
- Kurt Seiffert and George Turner now TOGAF certified architects
- NSF grant solicitations in particular requiring architecture-based methods more and more often
- We can help
- And a shameless plug for the keynote speaker at next springs Research Tech fair

Summary

- IU faculty are doing really great research, scholarship, and creative activities, and UITS research cyberinfrastructure is aiding those efforts.
- Most Research Technologies services are funded by RCM payments and are available to the IU community (faculty, staff, students) with no usage fees
- With implementation of IT-28 there are more options for departments and labs to purchase services via UITS. Departments have been willing to invest their own money in the past, and this adjustment in approach by UITS makes research support less like a zero sum game. Price points are important and we are working on that.
- RT can do custom programming and participate in grant-funded projects to provide dedicated support
- RT is particularly adept at aiding researchers in preparing competitive grant proposals (letters of commitment, facility statements, match in some circumstances, and we specialize in adjectives)
- If you have questions contact:
    - researchtechnologies@iu.edu (this opens a ticket automatically)
    - Craig Stewart – stewart@iu.edu (timeliness is less reliable)

Citation, Acknowledgments, & Disclaimers

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